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customerservice@mcelroytranslation.com

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DISPOSABLE DIAPER

Inventors: Makoto Suekane  
226-13 Fuchu  
Sakate, Kagawa

Toru Sasaki  
1203 Yamadai  
Kaeno, Kawano  
Ehime

Yoshikazu Jitoue  
761-2 Wadahama  
Toyohama, Mitoyo  
Kagawa

Applicant: 000115108  
 Uni Charm Corp.  
 182 Shimobun  
 Kaneo, Kawanoe  
 Ehime

Agents: 100066267  
 Yoshiharu Shirahama, patent  
 attorney, and one other

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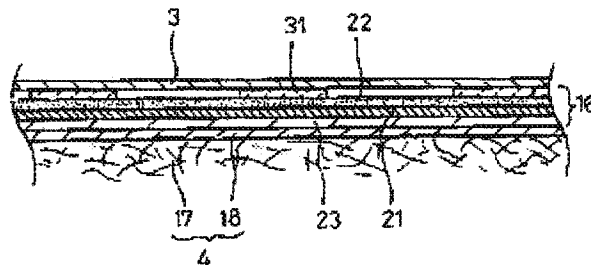
### Abstract

#### Problem

To make a pattern change in an indicator means in disposable diapers for notifying the mother about urination that is difficult to recognize a by child.

#### Means to solve

An indicator means 16 for informing about urination which is arranged between a rear sheet 3 and an absorptive core 4 of a disposable diaper 1 comprises an absorptive sheet 23, a first color section 21 formed in the sheet 23, and a second color section 22 formed in the sheet 23 so that it may be located between the rear sheet 3 and the first color section 21, and the second color section 22 is coated with a transparent hot-melt adhesive containing an oily component, and in a dried state, the color tone of the first color section 21 can be seen through the coated portion, but in a wet state, the color tone of the first color section 21 can be seen through the entire second color section 22 including the coated portion.



### Claim

Disposable diaper comprising an absorptive core placed between a liquid-permeable front sheet and liquid-impermeable rear sheet made of a light-permeable plastic sheet and fitted with an indicator means so that urination can be recognized from the outside of the front sheet,

wherein the indicator means comprises a water-absorptive sheet located between the rear sheet and the core; a first color section that has a color different from that of the rear sheet and can be observed any time from outside of the rear sheet and is formed on the water-absorptive sheet so that it faces the rear sheet and core sheet; and a second color section that is formed between the rear sheet and the rear sheet-facing side of the first color section so that it partially hides the color of the first color section when dry, but when wet a clear band is formed so that the color of the first color section can be observed from outside of the rear sheet, while the second color section is coated intermittently with a transparent hot-melt adhesive containing an oily component; the coated part makes the second color section transparent; the first and second color sections form a desired pattern recognizable from outside of the rear sheet; when the diaper is wet, the entire second color section including the coated part become transparent, and the pattern changes.

#### Detailed explanation of the invention

[0001]

Technical field of the invention

The present invention concerns disposable diapers fitted with an indicator means acknowledging urine discharge to the mother.

[0002]

Prior art

In the disposable diaper disclosed in Japanese Kokai Utility Model Hei 3[1991]-58416, an indicator means is utilized, containing a pattern formed from a variable color layer formed on the inner surface of a polyethylene rear sheet and a colored permeable layer covering the variable color layer. According to this means, discharged urine passes through the permeable layer, reaching the variable color layer, making the color layer transparent; thus, the pattern of the permeable layer can be observed from outside of the diaper, informing the mother that it is time to change the diaper.

[0003]

Problems to be solved by the invention

Such conventional indicator means is characterized by easy recognition of patterns upon urination. On the other hand, as children grow up, they also tend to develop pride, and if urine discharge is pointed out by other children who can easily observe the patterns themselves, the pride of the child who urinated may be hurt. To avoid this, it is not necessary that urination be easily recognized by children, and recognition by the mother only is sufficient. Thus, it is an

objective of the present invention to provide disposable diapers fitted with an indicator means providing such a desirable level of recognition.

[0004]

Means to solve the problems

For achieving said objective, the present invention proposes disposable diapers fitted with an indicator means where urination is recognizable from outside of the rear sheet, and this means comprises a liquid absorptive core between a liquid-permeable front sheet and liquid-impermeable rear sheet that is a transparent plastic sheet.

[0005]

The characteristics of the present invention in this proposal are that the indicator means comprises a water-absorptive sheet located between the rear sheet and the core; a first color section that has a color different from that of the rear sheet and can be observed at any time from outside of the rear sheet and is formed on the water-absorptive sheet so that it faces the rear sheet and core sheet; and a second color section that is formed between the rear sheet and the rear sheet-facing side of the first color section so that it partially hides the color of the first color section when dry, but when wet a clear band is formed so that the color of the first color section can be observed from outside of the rear sheet, while the second color section is coated intermittently with a transparent hot-melt adhesive containing an oily component; the coated part makes the second color section transparent; the first and second color sections form a desired pattern recognizable from outside of the rear sheet; when the diaper is wet, the entire second color section including the coated part become transparent, and the pattern changes.

[0006]

Practical embodiments of the invention

Next, the disposable diapers of the present invention are explained in detail with reference to the figures.

[0007]

The disposable diaper 1 whose partial perspective diagram is shown in Figure 1 is in a pants shape and comprises liquid-permeable front sheet 2, liquid-impermeable rear sheet 3, liquid absorptive core 4 between the two sheets 2 and 3, front body area 6, rear body area 7 and inseam area 8. The front and rear sheets 2 and 3 overlap in the area extended from the edges of the core 4 and bonded by a hot-melt adhesive (not shown). The edges of the front and rear body areas 6 and 7 overlap at right and left edges 9 and are welded intermittently in vertical directions,

forming the body opening 11 and right and left leg openings 12. At the edges of the openings 11 and 12, elastic parts 13 for the body and elastic parts 14 for the legs are bonded in a stretched state between the front and rear sheets 2 and 3 on the inner face of the sheets 2 and 3. The indicator means 16 for recognition of urine discharge is installed inside the rear sheet 3 at the body front area 6 and/or front inseam area 8

[0008]

When diaper 1 is dry, through the indicator means 16, the color of the first color section 21, shown by the diagonal lines, can be recognized from outside of the rear sheet 3. The first color section 21 has a color different from that of the rear sheet 3; thus, this section 21 can be recognized easily. Circular second color section 22 showing a color different from that of the first color section 21 is formed inside the first color section 21, such that the first color section 21 is partially hidden. The color of the second color section 22 can be recognized from outside of the sheet 3 if its color is different from that of the rear sheet 3 and cannot be recognized if its color is the same as the rear sheet 3. When the diaper 1 is wet, the second color section 22 becomes transparent, and entire indicator means 16 is recognized by the color of the first color section 21.

[0009]

Figure 2 shows a diagram of the cross section along the II-II of Figure 1. In the figure, the indicator means 16 is located between the rear sheet 3 and the core 4. The rear sheet 3 may be a plastic film such as polyethylene, polypropylene, etc., with a white to milky color and is transparent enough for easy recognition of the first color section 21 of the indicator means 16. Although the rear sheet 3 can be colorless and transparent, many users may not prefer this because the diaper interior would be too revealing.

[0010]

The core 4 may be pulverized pulp or a mixture of pulp with highly absorbent polymer 17 covered with tissue paper 18.

[0011]

The indicator means 16 comprises a water-absorbent sheet 23, a first color section 21 formed on the rear sheet 3 side of the sheet 23, and a second color section 22 that is formed intermittently on the first color section 21 and partially hides the first color section 21. The water-absorptive sheet 23, via hot-melt adhesive (not shown) coated intermittently on its bottom face, is bonded to the tissue paper 18 of the core 4. The first color section 21 is a layer of a

coating or printing ink displaying red, blue, etc., and is hydrophilic. The first color section 21 can be obtained by coating or printing then drying with an ink or coating material diluted with water comprising, e.g., 5-20 wt% of pigment having a color for easily recognizing the part 21 from the surroundings, 5-35 wt% of light-diffusing inorganic particles such as silica, alumina, etc., 5-25 wt% of hydrophilic acrylic binder and 30-75 wt% of water. When dry, the second color section 22 diffuses light, displaying a white or milky color, and it is almost impossible to recognize the first color section 21 through the part 22. On the other hand, when wet, light diffusion is reduced, forming a transparent band, making the first color section 21 visible. The materials for forming said second color section 22 may be, e.g., inks or coating materials diluted with water comprising 10-40 wt% of inorganic particles such as silica, alumina, etc., 5-25 wt% of hydrophilic acrylic binder, 40-85 wt% of water. Such inks or coating materials are printed or coated partially covering the first color section 21 and dried to obtain the second color section 22. In the figure, there are voids with a thickness corresponding to the second color section 22 between the rear sheet 3 and the first color section 21. However, in reality, the second color section 22 is so thin that the voids are negligible.

[0012]

In such diaper 1, urine moves from the core 4 to the second color section 22, and the part 22 becomes transparent upon wetting, resulting in the disappearance of the pattern formed by the first color section 21 and the second color section 22. The indicator means 16 has only the color of the first color section 21. The indicator means 16 does display a pattern caused by urine, and it displays a change in appearance as a change of the appearance of the first color section 21. This is easily understood by the mother, but not by a child. In the present invention, there are no strict differences in patterns, and only users can observe the difference.

[0013]

Figure 3 shows a cross section similar to Figure 2 to illustrate an example of the indicator means 16 for carrying out the present invention. In this indicator means 16, a first color section 21 is formed on the bottom side of the water absorptive sheet 23, and a second color section 22 is formed on the top side of the sheet 23. The indicator means 16 is bonded to a tissue paper 18 by a hot-melt adhesive (not shown) intermittently coated on the first color section 21 or the exposed area 27 of the bottom face of the water absorptive sheet 23. In the figure, the exposed area 27 is illustrated separate from the tissue paper 18, but the first color section 21 thickness is so small that the exposed area 27 is essentially bonded to the tissue paper 18. The disposable diaper 1 fitted with such indicator means 16 acts similarly as in Figure 1.

[0014]

Also, Figure 4 is a cross section similar to Figure 2 for illustrating an example of indicator means 16 for practicing the present invention. In the indicator means 16, the first color section 21 and the second color section 22 are laminated on the upper face of the water absorptive sheet 23 as shown in the figure, and a hot-melt adhesive 31 is coated intermittently on the upper face of the second color section 22. This hot-melt adhesive 31 may be colorless and transparent, or transparent with the same color as the first color section 21 and contains an oily component with the capability to penetrate into the second color section 22 and becomes transparent when the part 22 is wet. For this indicator means 16, when the diaper 1 is dry, a pattern is formed from the first color section 21 and the second color section 22 partially covering the section 21, and the pattern can be recognized through the rear sheet 3 and the hot-melt adhesive 31 from outside of the rear sheet 3. When the diaper 1 is wet, the second color section 22 exposed between the adhesive 31 and the adhesive 31 becomes transparent, making the first color section 21 visible. As a result, entire indicator means 16 is visible with the color of the first color section 21.

[0015]

In the present invention, there are no particular restrictions in terms of size, shape and location of the indicator means 16. Also, there are no particular restrictions in terms of patterns formed by the first color section 21 and the second color section 22 that partially hides the first color section. Hot-melt adhesives and pressure-sensitive adhesives may be used for bonding the constitutional parts of the diaper 1. When the parts are thermally fusible, the parts may be bonded by melt bonding instead of adhesion.

[0016]

Effect of the invention

In the disposable diapers of the present invention, the pattern changes in the indicator means by urine are easily recognized by the mother, but is difficult for children.

#### Brief description of the figures

Figure 1 is a partial perspective diagram of a disposable diaper.

Figure 2 is a cross section along the II-II line.

Figure 3 is a cross section similar to Figure 2 illustrating an example of an indicator means.

Figure 4 is a cross section similar to Figure 2 illustrating another example of an indicator means.



## Explanation of the reference symbols

- 1 Disposable diaper
- 2 Liquid-permeable surface sheet
- 3 Liquid-impermeable rear sheet
- 4 Liquid absorptive core
- 16 Indicator means
- 21 First color section
- 22 Second color section
- 23 Water absorptive sheet
- 31 Hot-melt adhesive

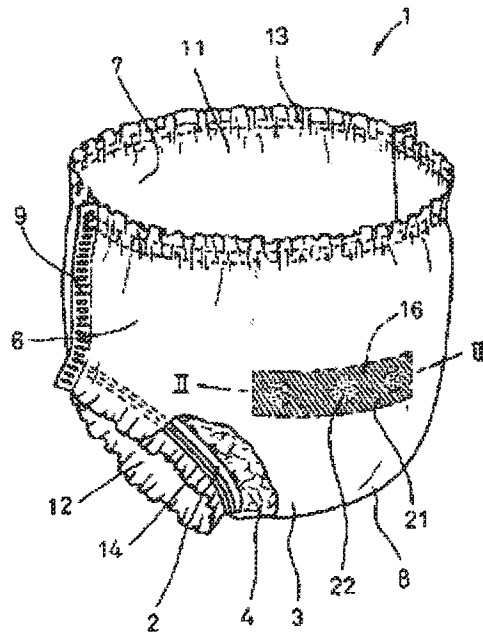


Figure 1

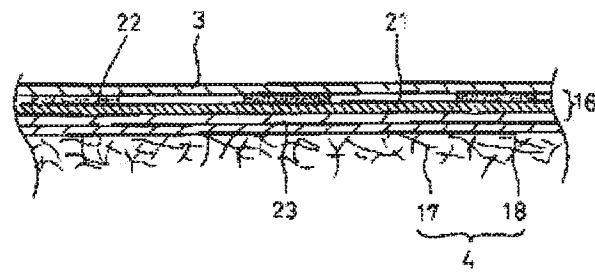


Figure 2

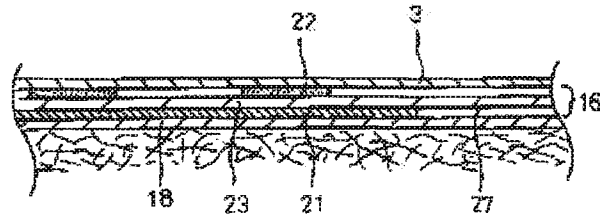


Figure 3

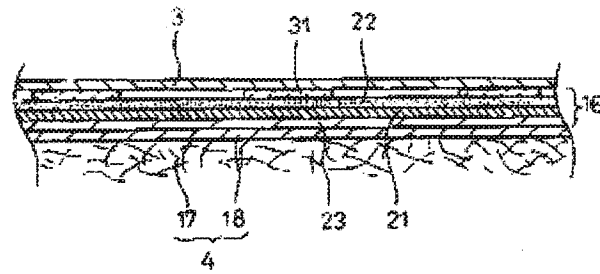


Figure 4